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SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			EXAMINER RUGGLES, JOHN S	
			ART UNIT 1756	PAPER NUMBER

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/642,657

Applicant(s)

KOIKE ET AL.

Examiner

John Ruggles

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 6, 7 and 11-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 8-10 is/are rejected.
- 7) ☒ Claim(s) 8-10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/19/03</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION*****Election/Restrictions***

Applicants' election with traverse of Group I (instant claims 1-5 and 8-10) on 5/27/05 is acknowledged. The traversal is directed only to the separation of Group I and Group III (instant claim 11) on the ground(s) that: (1) any search would necessarily cover both instant claim 10 (in Group I) and instant claim 11 (Group III) and (2) in US Patent 5,942,356, no separation was required during examination between claim 24 drawn to "a method of manufacturing a phase shift mask" and claims 29-32 drawn to "a method of manufacturing a semiconductor device".

However, this is not found persuasive for at least the following reasons: (1) Contrary to Applicants' assertion, the search required for instant claim 10 in class 430, subclass 5 does **not** include that for instant claim 11 in class 430, subclass 311 (as previously pointed out). (2) (A) The fact that restriction was not required in an earlier unrelated patent application has no bearing whatsoever on whether or not such a restriction can be required and maintained in the instant application. (B) Rather, the criteria and reasons for the instant restriction between Group I and Group III were set forth in the previous Office action mailed on 5/2/05. The basis for that restriction is still supported, because (i) the inventions of Groups I and III are distinct from each other in accordance with MPEP § 806.05(i) for the reasons previously set forth and (ii) these distinct inventions have acquired a separate status in the art as shown by their different classification as well as their recognized divergent subject matter (both of which were previously indicated and neither of which has been specifically disputed by Applicants). (3) Examination of these distinct inventions together would place serious additional burden on the USPTO Examiner

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for conducting the diverse searches that would be required for each of these distinct inventions (MPEP § 808.02).

Furthermore, MPEP § 803 states, in part, “a serious burden on the examiner may be *prima facie* shown if the examiner shows by appropriate explanation of separate classification, or separate status in the art, or a different field of search as defined in MPEP § 808.02”. The distinct inventions of Groups I and III have been previously shown to be separately classified, so Applicants’ request to withdraw the previous restriction requirement would place a serious burden on the Examiner. Therefore, the restriction requirement is still deemed proper and is now made FINAL.

Claims 6-7 and 11-14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to nonelected inventions.

### ***Drawings***

The drawing is objected to under 37 CFR 1.83(a) because it fails to show the polishing liquid supply portion 9, as described in the specification (at page 20 lines 13-14). Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A corrected drawing sheet in compliance with 37 CFR 1.121(d) is required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the

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remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawing is also objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "3" and "4" have both been used to designate the internal gear (at page 20 lines 8-27).

The drawing is further objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "4" has been used to designate both (A) the carrier (at page 20 lines 9-19) and (B) the internal gear (at page 20 lines 24-27).

A corrected drawing sheet in compliance with 37 CFR 1.121(d) is required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Specification*

The incorporation of essential material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper. Applicant is required to amend the disclosure to include the material incorporated by reference, if the material is relied upon to overcome any objection, rejection, or other requirement imposed by the Office. The amendment must be accompanied by a statement executed by the applicant, or a practitioner representing the applicant, stating that the material being inserted is the material previously incorporated by reference and that the amendment contains no new matter. *In re Hawkins*, 486 F.2d 569, 179 USPQ 157 (CCPA 1973); *In re Hawkins*, 486 F.2d 579, 179 USPQ 163 (CCPA 1973); *In re Hawkins*, 486 F.2d 577, 179 USPQ 167 (CCPA 1973). See MPEP § 608.01 (p) [R-1] I. In this case, the first paragraph on page 1 of the specification incorporates by reference the Japanese patent application (JP 2002-238576), to which priority is claimed. This JP document is not available in English and therefore cannot properly be incorporated by reference.

35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms, which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are: (1) at page 3 lines 14-15, the sentence "The change in phase angle results in degradation of CD (Critical Dimension) error characteristics, which is an unnegligible problem." is unclear as to whether or not the change in phase angle actually results in (a) degradation of CD error or (b) *increased* CD error, nevertheless for the purpose of this Office action, this sentence has been interpreted to mean --[[The]] This change in phase angle results in increased error and

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degradation of CD (Critical Dimension) ~~error~~ characteristics, which is not a[[n]] [[un]]negligible problem.--; (2) at page 7 lines 7-11, the language “convex surface defects...convex protrusions...having a height on the order of several nanometers and a **dimension** ranging from several tens nanometers to 2000 nanometers” (emphasis added) is also unclear regarding the metes and bounds for the word “dimension”, but for the purpose of this Office action, this language has been interpreted to mean --convex surface defects...convex protrusions...having a height on the order of several nanometers and [[a]] another dimension (other than height) ranging from several tens of nanometers to 2000 nanometers--; and (3) at page 13 lines 17-22, it is unclear why Applicants prefer a range of polishing time that includes shorter values (90-360 seconds) when using a lower polishing pressure up to 25 g/cm<sup>2</sup> than the range of polishing time not including these shorter values (180-360 seconds, excluding the range of 90 seconds to below 180 seconds) preferred when using a higher polishing pressure up to 100 g/cm<sup>2</sup>. Note that due to the number of errors, those listed here are merely examples of the corrections needed and do not represent an exhaustive list thereof.

Appropriate correction is required. An amendment filed making all appropriate corrections must be accompanied by a statement that the amendment contains no new matter and also by a brief description specifically pointing out which portion of the original specification provides support for each of these corrections.

### ***Claim Objections***

Claims 8-10 are objected to as being alternatively dependent (either directly or indirectly) on non-elected and withdrawn claim 6. Claims 8-9 each depends alternatively and directly on

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withdrawn claim 6 and claim 10 further depends on claim 9. However, for the purpose of this Office action and in order to advance the prosecution of this application, claims 8-9 have each been interpreted to alternatively depend only on elected claims 1, 2, or 4 (excluding improper dependency on withdrawn claim 6). See MPEP § 608.01(n).

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-3 and 8-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 2, the meaning of a “neutral” polishing liquid is not completely clear.

Embodiment 2 in the specification at pages 8-9 describe the term “neutral” to mean the polishing liquid is kept in a “neutral” range having a pH of 6 to 8, but preferably 7 to 7.6. In order to accord the broadest reasonable interpretation, the “neutral” polishing liquid in claim 2 has been interpreted in view of the specification to mean the polishing liquid --has a pH of 6 to 8--.

Claims 3 and 8-10 alternatively depend on claim 2.

***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –



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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Shibano et al. (JP 01040267 A).

Shibano et al. teach a method of producing a glass substrate for a photomask blank that includes plural successive polishing of the glass substrate, including a finish polishing step by colloidal silica abrasive (abstract). The colloidal silica has a specific surface area of 200-600 m<sup>2</sup>/g, a grain size of less than 300 microns, and is produced by hydrolysis of a alkoxy silane in a water-alcohol solution containing an ammonia alkali catalyst (which reads on instant claim 1 for polishing a mask blank for a photomask by using a polishing liquid containing colloidal silica abrasive grains produced by hydrolysis of an organosilicon compound). The pH of the colloidal silica is adjusted to 9-11 (e.g., by adding amine type alkali, etc., which is understood to avoid introduction and the presence of any alkali metal at all in the colloidal silica abrasive grains, reading on instant claim 3 for a concentration of 0.1 ppm or less alkali metal in the colloidal silica abrasive grains). A polishing cloth is pushed onto the glass substrate at a pressure of 0.01-1 kg/cm<sup>2</sup> (10-1,000 g/cm<sup>2</sup>, which clearly reads on the instant polishing pressure of 100 g/cm<sup>2</sup> or less). The finished glass substrate polished by colloidal silica has a surface roughness lower than

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20 Angstroms ( $< 2$  nm, which is notably lower than the order of several tens of nm for the height of “convex protrusions” on the instant polished glass substrate).

Claims 1-2 and 8 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Berkey et al. (US Patent 6,265,115).

Berkey et al. '115 teach projection lithography photomask blanks, preforms, and methods of making photomask blanks from a glass body that is subsequently post-treated (title, abstract). Photomask blanks and methods of making them suitable for lithography at a wavelength of 193 nm (corresponding to an ArF excimer laser) were previously known and have been popular (col. 2 lines 2-6). As shown by Figure 13, the method of making and post-treatment of photomask blanks taught by Berkey et al. '115 is suitable for photomask blanks used in lithography at wavelengths below 193 nm and particularly at 157 nm (vacuum ultraviolet, VUV, from an  $F_2$  excimer laser, col. 10 lines 4-19, reading on the instant claim 8 method of making photomasks for exposure by ArF or  $F_2$  excimer lasers). Post-treatment of the photomask blanks includes plural successive steps for progressively finer polishing, the last one or two steps of which include polishing the glass photomask blank with aqueous colloidal silica (having an average particle size  $\leq 50$  nm and a surface area of  $200 \text{ m}^2/\text{g}$  or less) that is buffered to a pH of 8 to 12 (approaching and reading on the instant claim 2 “neutral” polishing liquid containing colloidal silica grains interpreted to be at a pH of 6 to 8, for the reason set forth above). The combined polishing steps achieve a root mean square (RMS) finished surface roughness  $\leq 0.15$  nm (col. 13 lines 33-57). The instant claim 1 colloidal silica abrasive grains are recited to be produced by hydrolysis of an organosilicon compound, which is recognized to be in product-by-process

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format. Therefore, the colloidal silica abrasive polishing liquid taught by Berkey et al. '115 appears to be substantially identical (the same or similar) to the instant claim 1 polishing liquid containing colloidal silica abrasive grains (at least because the average particle size of  $\leq 50$  nm taught by Berkey et al. '115 clearly reads on Applicants' average particle sizes of 30-200 nm at instant page 22 lines 18-19 and 30-100 nm at instant page 27 lines 4-5).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shibano et al. (JP 01040267 A) in view of Berkey et al. (US Patent 6,265,115).

The teachings of Shibano et al. and Berkey et al. '115 are discussed above.

While teaching the other aspects of instant claim 3 (including a concentration of 0.1 ppm or less alkali metal in the colloidal silica abrasive grains of the polishing liquid), Shibano et al. do not specifically teach the instant claim 2 (on which instant claim 3 alternatively depends) "neutral" polishing liquid containing colloidal silica grains interpreted to be at a pH of 6 to 8 (for the reason set forth above).

However, it would still have been obvious to one of ordinary skill in the art at the time of the invention in the method of producing a glass substrate for a photomask blank that includes plural successive polishing steps (taught by Shibano et al.) to have alternatively buffered the colloidal silica polishing liquid to a pH of 8 to 12 as taught by Berkey et al. (approaching and reading on the instant claim 2 "neutral" polishing liquid containing colloidal silica grains interpreted to be at a pH of 6 to 8, for the reason set forth above). This is because (1) Shibano et al. and Berkey et al. '115 both relate to the same art of producing a glass substrate for a photomask blank that includes plural successive polishing steps using a pH adjusted polishing

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liquid having colloidal silica abrasive grains and (2) Berkey et al. '115 achieve a similar or even better finished surface roughness ( $\leq 0.15$  nm) on the glass substrate after polishing than was achieved by Shibano et al. (surface roughness  $< 2$  nm).

Claims 4-5 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Watanabe et al. (US Patent 6,277,465).

Watanabe et al. teach a glass substrate having a suppressed surface roughness, down to an average surface roughness  $\leq 1$  nm (title, abstract). This is achieved by plural polishing steps on the glass substrate, each at successively lower polishing pressures. The first polishing step uses cerium oxide in water at a polishing pressure of  $150\text{-}300$  g/cm<sup>2</sup> (col. 4 lines 33-56). The second polishing step also uses cerium oxide in water, but at a polishing pressure of  $25\text{-}150$  g/cm<sup>2</sup> (col. 4 line 57 to col.5 line 3). The third polishing step uses colloidal silica (grain size of 0.2 microns or less) in water as the polishing liquid at a polishing pressure of  $25\text{-}100$  g/cm<sup>2</sup> (col. 5 lines 4-20, reading on instant claims 4-5). While this glass substrate is intended to be used for a magnetic information recording medium (title, abstract), this method of successively polishing the glass substrate is equally suitable for achieving a similar average surface roughness for a glass substrate intended for making a photomask blank.

Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibano et al. (JP 01040267 A) in view of Watanabe et al. (US Patent 6,277,465).

The teachings of Shibano et al. and Watanabe et al. are discussed above.

While teaching the other aspects of instant claims 4-5 for plural polishing steps on a glass substrate, Shibano et al. do not specifically teach carrying out the plural polishing steps on the glass substrate at successively lower polishing pressures (including a subsequent finer polishing or protrusion suppressing step at a polishing pressure of  $100 \text{ g/cm}^2$  or less).

However, it would have been obvious to one of ordinary skill in the art at the time of the invention in the method of producing a glass substrate for a photomask blank that includes plural successive polishing steps (taught by Shibano et al.) to have used successively lower polishing pressures in these plural polishing steps on the glass substrate (as taught by Watanabe et al., reading on instant claim 4 and further reading on instant claim 5 by including a subsequent finer polishing or protrusion suppressing step at a polishing pressure of  $100 \text{ g/cm}^2$  or less), in order to achieve a similar or even better finished surface roughness ( $\leq 1 \text{ nm}$ ) on the glass substrate after polishing (as taught by Watanabe et al.) than was achieved by Shibano et al. ( $< 2 \text{ nm}$ ).

Claims 8-10 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Berkey et al. (US Patent Application Publication 2002/0004173).

Berkey et al. '4173 teach a photomask blank and a method of making it that involves polishing a glass substrate using colloidal silica (pH 8-12 and particle size  $\leq 50 \text{ nm}$ ) to achieve an average surface roughness  $\leq 5$  Angstroms and an RMS roughness  $\leq 0.15 \text{ nm}$  [0111]. After polishing the glass substrate, the method further includes forming a lithographic image pattern 300 on the polished glass photomask blank planar surface, preferably to result in a  $157 \text{ nm}$  VUV wavelength lithography patterned transmission photomask (reading on the instant claim 8

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method of making photomasks for exposure by an F<sub>2</sub> excimer laser at a wavelength of 157 nm) and preferably utilizing a deposited chromium (Cr) layer on the glass blank [0112] (instant claim 9 for forming a thin film that causes an optical change in exposure light by absorbing or blocking the exposure light incident on the Cr and instant claim 10 for patterning the thin Cr film). The instant claim 1 colloidal silica abrasive grains are recited to be produced by hydrolysis of an organosilicon compound, which is recognized to be in product-by-process format. Therefore, the colloidal silica abrasive polishing liquid taught by Berkey et al. '4173 appears to be substantially identical (the same or similar) to the instant claim 1 polishing liquid containing colloidal silica abrasive grains (at least because the average particle size of  $\leq 50$  nm taught by Berkey et al. '4173 clearly reads on Applicants' average particle sizes of 30-200 nm at instant page 22 lines 18-19 and 30-100 nm at instant page 27 lines 4-5).

Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. (US Patent 6,277,465) in view of Berkey et al. (US Patent Application Publication 2002/0004173).

The teachings of Watanabe et al. and Berkey et al. '4173 are discussed above.

While teaching the limitations of instant claim 4, on which instant claims 8-10 alternatively depend, Watanabe et al. do not specifically teach the further limitations of instant claims 8-10.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the plural successively fine polishing of a glass substrate (taught by Watanabe et al.) with subsequent patterning of a thin film that causes an optical change in exposure light

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(e.g., by patterning a thin film of Cr, etc.) on the glass substrate to form a patterned transfer mask having a finely polished glass substrate to be exposed by an F<sub>2</sub> excimer laser at a wavelength of 157 nm (as taught by Berkey et al. '4173). The finely polished glass substrates taught by Watanabe et al. and Berkey et al. '4173 have similarly smooth surfaces (both having similarly small surface roughness, e.g., for perfecting subsequent coating, etc., instant claims 8-10).

Applicants cannot rely upon the foreign priority paper(s) to overcome these rejections because a translation of said paper(s) has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.


### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Ruggles whose telephone number is 571-272-1390. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
John Ruggles  
Examiner  
Art Unit 1756  
**MARK F. HUFF**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 1700**